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Amendments to the Claims:

This listing of claims will replace all prior version, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) An isolated nucleic acid molecule encoding a splice variant of a gene sequence capable of being spliced to result in a reference human telomerase encoding [[of]] SEQ ID No: 2, wherein the splice variant has at least one of the following insertions or deletions:

(a) an insertion of sequence X (comprising SEQ ID No: 32) at nucleotide 1766 of SEQ ID No: 1;

(b) an insertion of nucleic acid sequence encoding sequence 1 (SEQ ID NO: 24) at nucleotide 1950 of SEQ ID No: 1;

(c) a deletion of nucleotides 2131 through 2166 of SEQ ID No: 1;

(d) a deletion of nucleotides 2287 through 2468 of SEQ ID No: 1;

(e) an insertion of sequence 2 comprising SEQ ID No: 29 at nucleotide 2843 of SEQ ID No: 1; and

(f) an insertion of nucleic acid sequence encoding sequence 3 (SEQ ID No: 31) at nucleotide 3157 of SEQ ID No: 1.

and wherein the splice variant does not encode SEQ ID No: 2.

2. (Canceled).

3. (Canceled)

4. (Currently Amended) The nucleic acid molecule of claim 1, wherein the nucleic acid molecule encodes one of ~~the amino acid sequence presented in Figure 11~~ (SEQ ID Nos: 35, 37, 39, 42, 44, 46, 48, 50, 52-54, 56-58, 60-62, 64-66, 68-70, 72-74, 76-78, 80-82, 84-86~~), or variant thereof, wherein said variant has at least 75% amino acid identity with said amino acid sequences presented in Figure 11~~.

5. (Currently Amended) An isolated nucleic acid molecule encoding any of ~~the amino acid sequences presented in Figure 11~~ (SEQ ID Nos: 35, 37, 39, 42, 44, 46, 48, 50, 56-58, 60-62, 64-66, 68-70, 72-74, 76-78, 80-82, 84-86~~), or which hybridizes under the following stringency conditions: 1 M Na+ at 65°C; 5X SSPE, 0.5% SDS, 5X Denhardt's~~

~~solution to the complement of one of the sequences thereof, provided that the nucleic acid molecule is not EST AA281296~~ or a variant thereof,

wherein said variant has at least 95% amino acid identity with said amino acid sequences and binds telomerase RNA (hTR) or has telomerase activity; and

wherein the nucleic acid does not encode SEQ ID No: 2.

6. (Currently Amended) An isolated nucleic acid molecule ~~comprising~~ consisting of any of ~~the sequences presented in Figure 10~~ (SEQ ID Nos.: [[18,]] 23, 25, 27, 29, 30, 32, 33~~), or which hybridizes under the following stringency conditions: 1 M Na+ at 65°C; 5X SSPE, 0.5% SDS, 5X Denhardt's solution to the complement of one of the sequences thereof~~, or the complement thereof.

7. (Withdrawn): An oligonucleotide comprising from 10 to 100 contiguous nucleotides from the sequence presented in Figure 1 or its complement.

8. (Withdrawn): An oligonucleotide comprising from 10 to 100 contiguous nucleotides from the sequences presented in Figure 10 or the complements thereof.

9. (Withdrawn): The oligonucleotide of either of claims 7 or 8, wherein the oligonucleotide is labeled.

10. (Withdrawn): The oligonucleotide of claim 9, wherein the label is a radiolabel, a chemiluminescent label, or biotin.

11. (Currently Amended) An expression vector, comprising a heterologous promoter operably linked to a nucleic acid molecule according to any of claims 1, [[2, and]] ~~4, 6, and 10~~ 2-4 and 5. MF 03/15/05

MF 12/08/04

12. (Original): The expression vector of claim 11, wherein the vector is selected from the group consisting of bacterial vectors, retroviral vectors, adenoviral vectors and yeast vectors.

13. (Previously presented): A host cell containing a vector according to claim 11.

14. (Original): The host cell of claim 13, wherein the cell is selected from the group consisting of human cell, monkey cell, mouse cell, rat cell, yeast cell and bacterial

cell.

15. (Original): The host cell of claim 13, wherein the cell is a human cell.

16. (Withdrawn): An isolated protein comprising a vertebrate telomerase protein.

17. (Withdrawn): The protein of claim 16, wherein the vertebrate is a human.

18. (Withdrawn): The protein of claim 16, wherein the protein comprises the amino acid sequence presented in Figure 1 or 11, or variant thereof.

19. (Withdrawn): A portion of a vertebrate telomerase protein.

20. (Withdrawn): The portion of claim 19, wherein the amino acid sequence of the portion is presented in Figure 1.

21. (Withdrawn): The portion of claim 19, wherein the amino acid sequence of the portion is presented in Figure 11.

22. (Withdrawn): The portion of claim 19, wherein the portion is from 10 to 100 amino acids long.

23. (Withdrawn): An antibody that specifically binds to the protein according to either claim 16 or 19.

24. (Withdrawn): An antibody that specifically binds to a polypeptide encoded by a sequence selected from the group consisting of region 1, region α, region β, region 2 and region 3.

25. (Withdrawn): The antibody according to claim 24, wherein the antibody is a monoclonal antibody.

26. (Withdrawn): A hybridoma that produces an antibody according to claim 14.

27. (Currently Amended) A nucleic acid probe that is capable of specifically hybridizing to a nucleic acid molecule encoding a splice variant of human telomerase <u>according to claim 1</u> ~~under the following stringency conditions: 1 M Na+ at 65°C;~~

~~5X SSPE, 0.5% SDS, 5X Denhardt's solution at 65°C,~~

wherein the probe consists of one of SEQ ID Nos: 23, 25, 27, 29, 30, 32 or 33 or the complement thereof;

or a fragment of SEQ ID Nos: 23, 29, 30, 31 or 32 or the complement thereof.

28. (Currently Amended) The probe of claim 27, wherein the fragment ~~probe~~ is from 12 to 200 nucleotides long.

29. (Currently Amended) The probe of claim 27, wherein the fragment ~~probe~~ is from 20 to 50 nucleotides long.

30. (Withdrawn): The probe of claim 17, wherein the nucleic acid molecule has the sequence presented in Figure 1 or its complement thereof.

31. (Previously presented): The probe of claim 27, wherein the nucleic acid molecule is labeled.

32. (Canceled)

33. (Withdrawn): The primers of claim 32, wherein the nucleic acid molecule comprises the sequence presented in Figure 1 or its complement.

34. (Canceled)

35. (Withdrawn): The primers of claim 32, wherein the pair of primers is capable of specifically amplifying sequence comprising all or a part of region 1, region α, region β, region 2, region 3 region X or region Y.

36. (Withdrawn): The primers of claim 35, wherein the primers flank nucleotide 222, 1950, 2131-2166, 2287-2468, 2843, or 3157 as presented in Figure 1.

37. (Withdrawn): The primers of claim 36, wherein only one of each primer pair flanks nucleotide 222, 1950, 2131-2166, 2287-2468, 2843, or 3157 as presented in Figure 1 and the other primer of the pair has sequence corresponding to one of the sequences presented in Figure 10 or complements thereof.

38. (Withdrawn): A pair of oligoprimers capable of specifically amplifying genomic sequence presented in Figure 10, wherein the primers amplify more than nucleotides 1 to 38.

39. (Withdrawn): An oligonucleotide that hybridizes specifically to a nucleic acid sequence in region 1, region α, region β, region 2, region 3 region X or region Y.

40. (Withdrawn): The oligonucleotide of claim 39, wherein the oligonucleotide is from 15 to 36 bases.

41. (Withdrawn): A method of diagnosing cancer in a patient, comprising preparing tumor cDNA and amplifying the tumor cDNA using primers that specifically amplify human telomerase nucleic acid sequence, wherein the detection of telomerase nucleic acid sequences is indicative of a diagnosis of cancer.

42. (Withdrawn): The method of claim 41, further comprising comparing the amount of amplified telomerase sequence to a control, wherein increase telomerase nucleic acid sequences over the control is indicative of a diagnosis of cancer.

43. (Withdrawn): The method of claim 41, wherein the primers span region 1, region α, region β, region 2, region 3 region X or region Y, wherein the pattern of amplification is indicative of a diagnoses of cancer.

44. (Withdrawn): The method of claim 43, wherein the primers are Htel Intron T and Htel 723B.

45. (Withdrawn): The method of claim 44, wherein the primers are Htel335T and Htel1022B.

46. (Withdrawn): A method of determining a pattern of telomerase RNA expression in cells, comprising preparing cDNA from mRNA isolated from the cells, amplifying the cDNA using primers according to claim 35, therefrom determining the pattern of telomerase RNA expression.

47. (Withdrawn): The method of claim 46, further comprising detecting the amplified product by hybridization with an oligonucleotide having all or part of the sequence of region 1, region α, region β, region 2, region 3 region X or region Y.

48. (Withdrawn): A method of diagnosing cancer in a patient, comprising determining a pattern of telomerase RNA expression, comprising amplifying telomerase from cDNA synthesized from tumor RNA, and detecting the amplified product by hybridization with an oligonucleotide having all or part of the sequence of region 1, region α, region β, region 2, region 3 region X or region Y, therefrom determining the pattern of telomerase

RNA expression, wherein the pattern is indicative of a diagnosis of cancer.

49. (Withdrawn): The method of claim 48, further comprising comparing the pattern to a pattern obtained from a reference cancer.

50. (Withdrawn): A non-human transgenic animal whose cells contain a vertebrate telomerase gene that is operably linked to a promoter effective for the expression of the gene.

51. (Withdrawn): The animal of claim 50, wherein the animal is a mouse.

52. (Withdrawn): The animal of claim 50, wherein the promoter is tissue-specific.

53. (Withdrawn): The animal of claim 50, wherein the telomerase gene is any of the nucleic acid sequences presented in Figure 11.

54. (Withdrawn): A mouse, whose cells have an endogenous telomerase gene disrupted by homologous recombination with a nonfunctional telomerase gene, wherein the mouse is unable to express endogenous telomerase .

55. (Withdrawn): An inhibitor of vertebrate telomerase activity, wherein the inhibitor binds to telomerase and is not a nucleoside analogue.

56. (Withdrawn): The inhibitor of claim 55, wherein the vertebrate is a human.

57. (Withdrawn): The inhibitor of claim 55, wherein the inhibitor is antisense nucleic acid complementary to human telomerase mRNA.

58. (Withdrawn): The inhibitor of claim 57, wherein the antisense is complementary to region α, region β, region 2, region 3 or region X.

59. (Withdrawn): The inhibitor of claim 55, wherein the inhibitor is a ribozyme.

60. (Withdrawn): A method of treating cancer, comprising administering to a patient a therapeutically effective amount of an inhibitor according to claim 55.

61. (Currently Amended): An isolated nucleic acid molecule consisting of ~~comprising~~ a sequence selected from the group consisting of region 1 (SEQ ID No:23), region

α (SEQ ID No:25), region β (SEQ ID No:27), region 2 (SEQ ID No:29) and region 3 (SEQ ID No:30) ~~as presented in Figure 10 and variants thereof, wherein said variant has at least 75% nucleotide identity with the nucleic acid sequences presented in Figure 11~~.

62. (Withdrawn): A method of identifying an effector of telomerase activity comprising:

(a) adding a candidate effector to a mixture of telomerase protein, RNA component and template, wherein the telomerase protein is encoded by an isolated nucleic acid molecule according to claim 1;

(b) detecting telomerase activity; and

(c) comparing the amount of activity in step (b) to the amount of activity in a control mixture without candidate effector, therefrom identifying an effector.

63. (Withdrawn): The method of claim 62, wherein the effector is an inhibitor.

64. (Withdrawn): the method of claim 62, wherein the nucleic acid molecule encodes human telomerase.

65. (Canceled)

66. (Canceled)

67. (Currently Amended): The nucleic acid molecule of claim 1, [[65]], wherein the splice variant of human telomerase has at least a deletion of nucleotides 2131-2166 of SEQ ID No: 1 ~~lacks nucleotide sequence encoding RTase motif A~~.

68. (Withdrawn): The nucleic acid molecule of any one of claims 65-67, wherein the splice variant of human telomerase lacks nucleotide sequence encoding a P-loop motif.

69. (Withdrawn): The nucleic acid molecule of any one of claims 65-68, wherein the splice variant of human telomerase lacks the C-terminal domain of the reference human telomerase.

70. (Withdrawn): The nucleic acid molecule of any one of claims 65-69, wherein the splice variant of human telomerase has an altered C-terminus comprising sequence encoding a consensus SH3 binding site.

71. (Canceled)

72. (Canceled)

73. (Currently Amended): The complement of the nucleic acid molecules [molecule] of any of claims 1, ~~4, 5, 6~~ 2, 3, 4 and ~~109~~ 21 ~~claim 65~~.

74. (Currently Amended): The nucleic acid molecule of any of claims 1, ~~4, 5, 6~~ 2, 3, 4 and ~~109~~ 21 ~~claim 65~~, wherein said molecule is a DNA molecule.

75. (Currently Amended): The nucleic acid molecule of any of claims 1, ~~4, 5, 6~~ 2, 3, 4 and ~~109~~ 21 ~~claim 65~~, wherein said molecule is an RNA or cDNA molecule.

Claims 76-85. (Canceled)

86. (Withdrawn): An oligonucleotide comprising 15-100 contiguous nucleotides of one of the sequences presented in Figure 10 (SEQ ID Nos: 18, 23, 25, 27, 29, 30, 32, 33) or the complements thereof.

87. (Withdrawn): The oligonucleotide of claim 86, wherein the oligonucleotide is from 15 to 36 nucleotides long.

88. (Previously presented): The oligonucleotide of claim 86, wherein the oligonucleotide is from 20 to 50 nucleotides long.

89. (Withdrawn): The oligonucleotide of claim 86, wherein the oligonucleotide is labeled.

90. (Withdrawn): The oligonucleotide of claim 89, wherein the label is a radiolabel, a chemiluminescent label, or biotin.

91. (Withdrawn): A pair of oligonucleotide primers that amplify sequence selected from the group consisting of region 1 (SEQ ID No: 23), region α (SEQ ID No: 25), region β (SEQ ID No: 27), region 2 (SEQ ID No: 29), region 3 (SEQ ID No: 30), region X (SEQ ID No: 32) or region Y (SEQ ID No: 18).

92. (Canceled)

93. (Currently Amended): A pair of oligonucleotide primers that amplify nucleic acid sequence of human telomerase containing a splice junction, wherein only one primer of each primer pair flanks nucleotide ~~222,~~ 1950, 2131-2166, 2287-2468, 2843, or 3157

as presented in Figure 1 (SEQ ID No: 1) and the other primer of the pair has sequence corresponding to all or a portion of one of the sequences presented in Figure 10 (SEQ ID Nos: ~~18,~~ 23, 25, 27, 29, 30, 32, 33) or complements thereof.

94. (Withdrawn): A method of diagnosing cancer in a patient, comprising preparing tumor cDNA and amplifying the tumor cDNA using a pair of oligonucleotide primers that amplify sequence selected from the group consisting of region 1 (SEQ ID No: 23), region α (SEQ ID No: 25), region β (SEQ ID No: 27), region 2 (SEQ ID No: 29), region 3 (SEQ ID No: 30), region X (SEQ ID No: 32) or region Y (SEQ ID No: 18), wherein the pattern of amplification is indicative of a diagnosis of cancer.

95. (Withdrawn): A method of diagnosing cancer in a patient, comprising preparing tumor cDNA and amplifying the tumor cDNA using a pair of oligonucleotide primers that amplify sequence of human telomerase containing a splice junction, wherein the primer pair flanks nucleotide 222, 1950, 2131-2166, 2287-2468, 2843, or 3157 as presented in Figure 1 (SEQ ID No: 1), wherein the pattern of amplification is indicative of a diagnosis of cancer.

96. (Withdrawn): A method of diagnosing cancer in a patient, comprising preparing tumor cDNA and amplifying the tumor cDNA using a pair of oligonucleotide primers that amplify sequence of human telomerase containing a splice junction, wherein only one primer of each primer pair flanks nucleotide 222, 1950, 2131-2166, 2287-2468, 2843, or 3157 as presented in Figure 1 (SEQ ID No: 1) and the other primer of the pair has sequence corresponding to all or a portion of one of the sequences presented in Figure 10 (SEQ ID Nos: 18, 23, 25, 27, 29, 30, 32, 33) or complements thereof.

97. (Withdrawn): A method of determining a pattern of telomerase RNA expression in cells, comprising,

preparing cDNA from mRNA isolated from the cells,

amplifying the cDNA using primers that amplify a splice variant of nucleic acid encoding human telomerase and

detecting the amplified product by hybridization with all or part of the sequence of region 1 (SEQ ID No: 23), all or part of the sequence of region α (SEQ ID No: 25), all or part of the sequence of region β (SEQ ID No: 27), all or part of the sequence of region 2 (SEQ ID No: 29), all or part of the sequence of region 3 (SEQ ID No: 30), all or part of the sequence of region X (SEQ ID No: 32) or all or part of the sequence of region Y (SEQ

ID No: 18);

therefrom determining the pattern of telomerase RNA expression.

98. (Withdrawn): A method of diagnosing cancer in a patient by determining a pattern of telomerase RNA expression, comprising,

amplifying sequence of human telomerase from cDNA synthesized from tumor RNA using primers that amplify a splice variant of human telomerase, and

detecting the amplified product by hybridization with all or part of the sequence of region 1 (SEQ ID No: 23), all or part of the sequence of region α (SEQ ID No: 25), all or part of the sequence of region β (SEQ ID No: 27), all or part of the sequence of region 2 (SEQ ID No: 29), all or part of the sequence of region 3 (SEQ ID No: 30), all or part of the sequence of region X (SEQ ID No: 32) or all or part of the sequence of region Y (SEQ ID No: 18),

therefrom determining the pattern of telomerase RNA expression, wherein the pattern is indicative of a diagnosis of cancer.

99. (Withdrawn): The method of claim 98, further comprising comparing the pattern to a pattern obtained from a reference cancer.

100. (Withdrawn): A nucleic acid molecule encoding a human telomerase that lacks RTase motifs A, B, C, and D.

101. (Canceled)

102. (Withdrawn): The nucleic acid molecule of either of claims 101 or 102, wherein the human telomerase lacks a P-loop motif.

103. (Withdrawn): The nucleic acid molecule of either of claims 101 or 102, wherein the human telomerase has an altered C-terminal domain comprising a consensus SH3 binding site.

104. (Withdrawn): The nucleic acid molecule of either one of claims 101 or 102, wherein the human telomerase lacks the C-terminal domain of the human telomerase presented in SEQ ID No. 2.

105. (Withdrawn): A nucleic acid molecule encoding a human telomerase that lacks a P-loop motif.

106. (Withdrawn): A nucleic acid molecule encoding a human telomerase that has an altered C-terminal domain comprising a consensus SH3 binding site.

107. (Withdrawn): A nucleic acid molecule encoding a human telomerase that lacks the C-terminal domain of the human telomerase presented in SEQ ID No. 2.

108. (New) An isolated nucleic acid molecule encoding any of SEQ ID Nos.: 24, 26, 28, or 31.

109. (New) The probe of claim 31, wherein the label is a chemiluminescent label, a radioactive label, or biotin.

110. (New) The nucleic acid molecule of claim 1, wherein the splice variant of human telomerase has at least an insertion of nucleic acid sequence encoding sequence 3 (SEQ ID No:31) at nucleotide 3157 of SEQ ID No: 1

111. (New) An oligonucleotide consisting of 15-100 contiguous nucleotides of one of the sequences selected from the group consisting of SEQ ID Nos. 23, 29, 30, 32, 33 or the complements thereof.

112. (New) The oligonucleotide of claim 111, wherein the oligonucleotide is labeled.

113. (New) The oligonucleotide of claim 112, wherein the label is a radiolabel, a chemiluminescent label, or biotin.

114. (New) A pair of oligonucleotide primers that amplify sequence selected from the group consisting of region 1 (SEQ ID No: 23), region α (SEQ ID No: 25), region β (SEQ ID No: 27), region 2 (SEQ ID No: 29), region 3 (SEQ ID No: 30), region X (SEQ ID No: 32), wherein the primers comprise at least 15 contiguous nucleotides of one of SEQ ID Nos: 23, 25, 27, 29, 30, 32, or 18 or complements thereof and wherein the primers are from 15 to 50 nucleotides in length.

115. (New) A method of determining a pattern of telomerase RNA expression in cells, comprising,

(a) preparing cDNA from mRNA isolated from the cells,

(b) amplifying the cDNA using primers that amplify a splice variant of nucleic acid encoding human telomerase to form an amplified product and

(c) hybridizing the amplified product with one or more of the following :

all or at least 15 contiguous nucleotides of the sequence of region 1 (SEQ ID No: 23), all or at least 15 contiguous nucleotides of the sequence of region β (SEQ ID No: 27), all or at least 15 contiguous nucleotides of the sequence of region 2 (SEQ ID No: 29), all or at least 15 contiguous nucleotides of the sequence of region 3 (SEQ ID No: 30), or all or at least 15 contiguous nucleotides of the sequence of region X (SEQ ID No: 32); or a complement thereof; and

(d) detecting hybridization;

therefrom determining the pattern of telomerase RNA expression.

116. (New) A method of determining a pattern of telomerase RNA expression in cells, comprising,

(a) preparing cDNA from mRNA isolated from the cells,

(b) amplifying the cDNA using primers that amplify a splice variant of nucleic acid encoding human telomerase to form an amplified product and

(c) hybridizing the amplified product with two or more of the following:

all or at least 15 contiguous nucleotides of the sequence of region 1 (SEQ ID No: 23), all or at least 15 contiguous nucleotides of the sequence of region α (SEQ ID No: 25), all or at least 15 contiguous nucleotides of the sequence of region β (SEQ ID No: 27), all or at least 15 contiguous nucleotides of the sequence of region 2 (SEQ ID No: 29), all or at least 15 contiguous nucleotides of the sequence of region 3 (SEQ ID No: 30), all or at least 15 contiguous nucleotides of the sequence of region X (SEQ ID No: 32) or all or at least 15 contiguous nucleotides of the sequence of region Y (SEQ ID No: 18); or a complement thereof; and

(d) detecting hybridization;

therefrom determining the pattern of telomerase RNA expression.

117 (New) The method of either of claims 115 or 116, wherein the contiguous nucleotides contain a label.

118. (New) The method of claim 117, wherein the label is radioactive, chemiluminescent, or biotin.